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SCIENCE (TEACHING) IS NOT NEUTRAL. WHICH SIDE DO WE CHOOSE TO SUPPORT?

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Resumen

Science teaching is not neutral, from the social point of view. It can strengthen present civilization crisis. Or not. What is our choice? But, do we indeed have a choice? The way science teaching research has been conducted seems to indicate that most of it serves to maintain everything the way it is – with all privileges, intolerances and exclusions included. In this work we bring about this discussion emphasizing the perspective of the sociology of science. We argue that without a major change of focus in that research area towards the inclusion of a sociological approach in teacher formation and their daily life in science classes, science teaching may be hold co-responsible for intensifying the problems our world is presently facing.

Aims

Science education can serve to purposes we may not agree, from cultural and social points of view. It may contribute to intensify or to reverse the civilization crisis we face.

The way most of science teaching research has been conducted seems that the choice has already been done (even if not consciously or with everyone's agreement). That choice is to contribute: 1) to widen the separation between scientific and humanities cultures; 2) to reinforce social inequalities; and 3) to argue for

the ontological superiority of the scientific epistemology – regarding all other human possibilities of knowledge construction amusing and culturally interesting, although useless in the modern technological and quickly changing world.

Any of those three contributions provides a feedback to each other, in a complex and synergetic inter-relationship. That helps to construct a world view that is not scientifically based or oriented – as their defenders argue or expect –, it is not even a view in which people are enabled to think in a more reasonable ground. Those procedures help instead to construct a biased and prejudicial world view. The result is an efficient contribution of the science teaching programme to maintain everything the way it is – for better or worse.

In this work we bring about this discussion emphasizing the perspective of the sociology of science to hopefully address a solution for the present uncomfortable – to say the least – situation in the science teaching research. We argue that without a major change of focus in that research area it may separate us from actual human problems. Such a change implies to include a sociological approach – particularly sensitive to a post-modern anthropological view concerning epistemological issues – in teachers formation programmes.

Framework

We adopt a sociological point of view and work from hermeneutic and phenomenological bases to analyse the problem put in the previous section. We follow mainly the lines pointed by the authors cited in the references.

Methodological Approach

On the theoretical side, we adapted and applied, in hermeneutic and phenomenological bases, the approaches of sociological and externalist historical views on the nature of science to our practical pedagogical interventions with science teachers.

On the practical side, we worked with science teachers in service, mainly – but not exclusively – from the graduate classes we have taught for some years on *Philosophy of Science* at the Universidade Federal do Rio Grande do Norte.

According to the approach we adopt we did not apply questionnaires or any quantitative tools to obtain the results point out below. Those are obtained from hermeneutic analyses on oral and written reports collected

from those teachers. That approach highlights assumptions and prejudices present in the structuring of our comprehensions.

Results

The conclusion is unequivocal: without exception the science teachers we worked with completed all their formal education – basic and professional one – with no contact at all with sociological approach to the nature of science studies. Worse than that, those teachers: 1) had common sense conceptions concerning the nature of science; 2) had no conscience of the interbreeding relationships among science, science education, social issues, political power, economics, cultural world views; besides they 3) were unaware of their own scientific realistic conception guiding their ideas and practices in science teaching and supporting their thoughts in what concerns science itself.

Science teaching may change the world in one direction or another, but not necessarily into a better world, as it is usually assumed by those working with science education. Currently science serves more to power than to people. Science teaching often reinforces such a bias.

Science can help us to construct a better world, but the emphasis it has been prioritizing may favour exclusion, beginning with the epistemological one. The speeches say we should value and preserve diversities, including cultural ones. The practices, however, say the truth can come only through scientific knowledge. Such an obvious contradiction seems not to be notice in all its serious implications by those worried in promoting science – and science teaching, as an extension.

That basic contradiction splits into several others. Despite the constructivist discourses, the background mentality in science teaching formation is that of a scientific realism, in which science, and only science, can provide us the real or meaningful knowledge. If one attends some current science classes one can note what is taught and how it is done – despite decades of science teaching research and supposedly worries in including history and philosophy of science into the science teaching curricula.

Should science teachers contribute to reproduce the world – with all its discriminations – or should they contribute to change it towards a world with stronger humanity and solidarity purposes? Science teachers and science teaching researches seem to exclude that kind of discussions from their worries and aims. Science-Technology-Society-Environment approaches do not solve that problem, on the contrary. As a result we have endless works concerning the improvement in teaching and learning strategies, most of them concentrating on cognitive matters – from a limited conception of cognition, mostly attached to just one kind of rationality –, and practically nothing concerning sociological aspects of science and epistemology from a much broader conception than just the usual theory of science perspective.

It is a common place to hear that the discussion of those aspects is already overcome and such a subject is not of present interest. From philosophical and sociological points of view that discussion evolved indeed – although even so that does not mean that it is overcome –, however from the classroom point of view it is

evident that such a discussion never really reached science teaching training neither student formation at the degree of depth and dedication they need to be emphasized.

Conclusions

We face a serious problem in science teaching research. Our omission in properly addressing social and post-modern related issues is making us to serve to reproduce the prevailing tendency, which adopts the cognitive-instrumental rationality of science as the most important one. This reinforces distortions and the civilization crisis we face today.

Our study involved teachers in service who were selected among many others. It means that they may be considered very good and well formed teachers! We know from the literature that the situation described here is typical everywhere in the world.

What have we science teaching researchers been doing? It seems we are trying to ignore a whole very explicit and dangerous picture we have in front of our eyes. Or did we already make a choice? We owe society a clear and unambiguous answer. The present predominant tendency in that area suggests that we are not fully aware of what is involved or of our direct responsibility to help finding the solution.

We argue that we shall side with diversity, beginning with the epistemological one, the source of all others.

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